DOCUMENT RESUME

ED 078 096 TM 002 916

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TITLE	A Developmental Study of Group Formation in Children.
INSTITUTION	Chicago Univ., Ill. Committee on Human Development.
PUB DATE	Feb 73
NOTE	20p.; Paper presented at the Annual Meeting of American Educational Research Association (New Orleans, Louisiana, February 25-March 1, 1973)
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Child Development; *Cognitive Development; *Concept Formation; Elementary School Students; *Group Dynamics; *Learning Theories; *Social Behavior; Technical Reports
IDENTIFIERS	*Piaget (Jean)

ABSTRACT

The study of children's group formation employs Piaget's cognitive-development theory along with ethological concepts and methods used in the naturalistic study of the social behavior of animals. It represents the first application of ethological ideal to a study of the child's conception of his social world, and focuses on his conceptions of the dominance relations within the class, and the effect his perceptions of others have on his behavior when interacting with classmates. Subjects were 500 public school children, aged three to nine. Preliminary results seem to indicate the usefulness of integrating Piaget's work in development with ethological ideas of adaptation. (Author)

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A DEVELOPMENTAL STUDY OF GROUP FORMATION IN CHILDREN

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TM 002 916

A Paper to be presented at the American Educational Research Association Annual Meeting, New Orleans, February, 1973.

Introduction

Frequently children confront large numbers of peers for the first time when they start school. During a relatively short period of time children establish a position for themselves within their classroom, make friends, and learn to cooperate with others. An ethological approach to the analysis of this process would suggest that the ways in which children begin integrating themselves into classroom social structures should show phylogenetic similarities with the social interactions performed by the juveniles of other primate species. These similarities could occur on the levels of 1) gestures expressed toward peers, 2) the amount and type of physical interaction, 3) spacing patterns and activity levels, and 4) the total organization of group structures.

A basic feature of social structures in primate troops is the dominance hierarchy. This hierarchy is a linear or quasi-linear arrangement of individuals which provides differential access to portions of the environment. It may also provide a locus of attention within which certain individuals can function as troop leaders, and it definitely provides a group structure which minimizes inter-individual conflict. One of the problems facing the young as they grow and develop is to be able to establish and maintain a position within this hierarchy.

A very similar problem appears to face human children. For eventual functioning within adult society they would need to first be able to establish and maintain contact with their peers. For each child this involves being able to recognize relationships among his peers, and making a place for himself within these networks of interaction. Of perhaps greatest importance in this process of moving towards others is for a child

to be able to maintain a high feeling of self-esteem until his position within his social world is fairly secure.

In this study, phylogenetic continuities were sought between patterns of social interaction in children and other primates. The interactions examined were then presumed to affect the children's perceptions of their peers. In particular, the children were questioned to find out if dominance hierarchies occured within their classes, and what the developmental changes were in these hierarchical structures. Four hundred and fifty children from a private middle-class school were observed and tested. They ranged in age from nursery school through third grade. A variety of methods were used but because of time limitations only three will be described: 1) Group Size, and 2) Nearest Neighbor data were collected on the playground, and 3) a Hierarchy test that was given in the classroom.

Observations and Test Methods

Playground observations

The first method - Group Size - involved watching the playground for a few minutes to see which children were moving together in games or other activities, and then scanning the playground from right to left recording all of the groups as they occurred. Children moving together, e.g., as in a game of dodge ball, were counted as being in a group. Children stationary, but within one meter of another child, were counted as being together, even if they were not interacting. A child standing alone was counted as a group of size one.

The second method - Nearest Neighbor - recorded individual spacing patterns and modes of interaction (Kummer, 1968; Sommer, 1969). A scoring

sheet was used and is included at the back of this paper (see Criterion for Observations). In particular, the four categories of behavior that were recorded on the sheets were: 1) the first, second and third neighbor of the child being observed, 2) the relative distance between the child and each of his neighbors, 3) the type of interaction, if any, occuring between the child and his neighbors, and 4) the activity level of the child during a portion of the observation period. A first neighbor is defined as the child spatially closest to the child being observed, the second neighbor as second closest, etc.

The observation period for each class was the morning recess period, 15 to 20 minutes in length. The classes tended to stagger their recess periods so that normally an entire class could be observed without confusion. When the children were of more than one grade level the size differential between the children permitted recording to continue. In the few instances when more than one class of the same level were on the playground the children were recorded as being in kindergarten, first grade, etc. and not in a particular class.

To be sure of observing each child the number of boys and girls in a class were noted as they came onto the playground. The child to be observed was selected by dividing the playground into two halves. A boy and a girl were observed on one half, and then a girl and a boy were observed on the other half. A short description was made of each child so that he or she would not be observed twice. The child was selected, watched for approximately ten seconds to familiarize the observer with the situation, and then his interactions, distance from neighbors, etc. were recorded for the next 15 second period. The distance covered - the activity level of the child - was recorded during the subsequent 30 second period.

Results of the playground observations

In the grades after nursery school, the size of boys' groups were larger than were girls' groups (Table 1). This was both in terms of the maximum and average size of the groups ($p \leq .05$). The average size of the groups increased for both sexes as they matured, but the boys' rate of increase was higher. The maximum size of the boys' groups continued to increase across the grades, while the girls appeared to have a maximum of five or six children at any grade level. The very large boys' groups usually contained a few girls, and in those classes where the children were known to the observer those girls tended to be near the top of the girls' hierarchy.

Table 2 shows that boys played with boys, while girls tended to be near girls. The three nearest neighbors of boys were boys in 48.5 to 74.0 percent of the observations, and the girls similarly had girls as neighbors in 48.5 to 69.9 percent of the observations across the grades from nursery school to second grade. However the girls were near teachers a significantly larger percent of the observations than were the boys ($p \leq .005$). The contact for both sexes with an adult declined steadily with increasing age, the largest decrease occurring after nursery school where over 20 percent of the observations showed both sexes near a teacher. Their high percent of time near teachers in nursery school may be due in part to their also being observed inside during "free time".

Physical interaction, such as playful wrestling, holding hands, or throwing a ball to one another increases with age for both sexes, but it reaches a peak for the boys earlier than for the girls (Table 3). Aggressive and verbal encounters were recorded separately. The boys were

found to be significantly more aggressive across the grades ($p \leq .009$) with peaks in kindergarten and first grade, while the girls were more verbal at all grades ($p \leq .005$).

For all grades from nursery school through second grade the boys were more active ($p \leq .05$). Boys also maintained a greater distance between themselves and other children ($p \leq .05$), and between themselves and any teachers present on the playground. If opposite sex neighbors happened to occur they were significantly farther apart than same sex neighbors ($p \leq .001$)

In general, the playground groups of young children were found to be like the social interactions which occur among ground dwelling primates. The boys gathered in larger and more active groups than did the girls. Boys played with boys, while girls played with girls. The girls also associated with adult females more frequently than did the boys. They boys were more aggressive but, as with some juvenile female primates, some of the girls could be found in the rough-and-tumble boys' groups (Kummer, 1968)

Hierarchy test

The existence of dominance hierarchies in primate troops is generally inferred from the physical encounters which occur between troop members. The recording of aggressive encounters on the playground only indicated that boys fought more than girls. A hierarchy could not be derived from these observations because the individual children involved were not recorded. Instead of making more detailed observations we questioned the children about the dominance hierarchy which they perceived within their classrooms. The basic question asked was "Who is the

toughest?"[1]. Two different forms of the test were used depending on the age of the children.

In nursery school and kindergarten the children were photographed and snapshot size pictures were made of each child. On the day of the test each child was individually taken out into the hall. He was shown the photographs of his classmates, placed horizontally on a bench or on the floor. The photographs were arranged in alphabetical order by first name.

The instructions were : "I'm going to ask you some questions about your classmates. The first question is about toughness. Now what is another word for tough?" (If the child had trouble answering he was told "Do something tough"). "Now let us look at the first child in the row. If that child is tougher than you, turn his picture over." After the child acted the experimenter made sure he understood the question. The experimenter then repeated the question with each picture until he was confident that the child understood the task. Then he said "Now continue on down the row, turning over the picture of each child that is tougher than you."

From first grade through third grade a paper and pencil test was used. The children's names were listed alphabetically down the side of a sheet of paper. The paper was cut so that tabs with each child's name could be easily torn off. The children were also given a sheet of paper with the numbers one through the size of the class listed down the left

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1. Other questions were "Who is the smartest, nicest, and has the most friends?" Of these "toughest" had the earliest and highest dyadic agreement. Research is continuing in this area.

hand side. The children were told to "Look through the list of names and tear off the name of the child who is the very toughest in the class. Place that name beside the number one. Now look through the list and find the next toughest child and place that name beside the number two, etc."

Results of the Hierarchy test

The distribution of children across a dominance hierarchy results in boys being placed near the top, girls near the bottom, and considerable overlap in the middle (Table 4). This is the same pattern found in many primate troops (Carpenter, 1964). As can be seen in Table 4 the configurations of the hierarchies change with age.

The basic unit of analysis for the Hierarchy test was the dyads of established dominance. The percent of dyadic agreement was formed by taking those pairs where both children agreed on who was the dominant child and dividing by the possible dyads from the class. For example, if John said that Bill was 'tougher' than John, and Bill said that Bill was 'tougher' than John, this pair was said to be an established dyad on 'toughness'.

Following the ages suggested by Piaget, it was hypothesized that the school age child (age 7, first grade in our sample) could readily perceive a hierarchical relationship, and hence would have a higher dyadic agreement than the preschool child. This was tested on the kindergarten through third grade sample. In examining all of the possible dyads within each class it was found that there was a highly significant linear trend ($F=79.2$, $p \leq .0001$). The largest jump in agreement on relative status occurred between kindergarten (40%) and first grade (62%). This large

increase in percent of dyadic agreement corresponded to a similar increase on a smaller sample where the underlying cognitive level was measured (see Edelman, 1973). Children seemed to develop a consistent perception of their dominance structure at the same time as they were developing the logical operations of seriation and transitivity.

The peak in aggressive encounters on the playground for the boys extended across kindergarten to first grade, and the children's perceptions of dominance relationships appeared to follow from this experience. As discussed elsewhere, the younger nursery school children fought much less and were almost unable to form a hierarchy (Edelman and Omark, 1973). They gave extremely self-centered responses, almost always placing themselves first or second in any hierarchy, but experiences in kindergarten and first grade seemed to structure their perceptions in a way that substantiated the view that a dominance hierarchy existed within each classroom.

From the results of primate studies it was hypothesized that most agreement on 'toughest' would be boy-girl pairs followed by boy-boy pairs and then girl-girl pairs. This hypothesis was clearly confirmed by the results. Boy-girl pairs had an agreement of 69.4%, boy-boy pairs had an agreement of 54.9%, and girl-girl pairs had 51.7%. The difference between cross-sex dyads and boy dyads was highly significant ($F=16.5$, $p \leq .0008$), as well as the difference between boy-boy and girl-girl dyads ($F=5.02$, $p \leq .036$).

Accuracy

On the playground boys were found to play with boys, and girls played with girls. The boys were also in larger groups and more frequently involved in rough-and-tumble play, while the girls quietly talked in groups

of twos and threes. Hence the boys were seen as tougher than the girls, and they appeared to have more completely worked out the status relationships between each other. Considering the amount of involvement which each sex appeared to direct toward itself it was rather surprising to find that each sex could produce the same hierarchy for the opposite sex as that sex produced for itself.

The children were scored for their accuracy of perception. The percent accuracy of perception measured each child's perception of dominance in those pairs of established dominance of which he or she was not a member (number of correct choices of the dominant child in the dyad of established dominance divided by the total number of dyads where agreement occurred). Although there were differences in dyadic agreement among the different sex pairings there was no difference in the percent accuracy of perception for these sex pairings ($F=1.17$).

Not only did boys and girls have a similar level of agreement about their own sex group, the rank orders produced by each of the sex groups was highly correlated. The average correlation in a class between the average rank orders produced by the boys and the order produced by the girls when ranking the boys was 0.86 and when both groups ranked the girls the average correlation was 0.79.

Thus, although the males were more involved in working out their dominance relationships with each other and hence have a more clearly defined dominance order, the girls can perceive the dominance relations of both boys and girls as accurately as can the boys. This finding supports the parallel to primate social structure suggested by Chance and Jolly (1970), that stable group functioning is dependent upon all members of the group paying attention to the dominant members.

Overrating

Entrance into a dominance hierarchy would not appear to be an easy task. As seen earlier, with children, or at least boys, this means involvement in aggressive encounters and at best numerous knocks to one's ego. The egocentricity of nursery school children suggests a means through which this entrance may prove to be less than traumatic. As found by McGrew (1972) in his study of preschoolers, it did not seem to matter in terms of children's subsequent behavior whether they lost an encounter to another child of lower status than themselves. A similar result seemed to occur, at least for the boys, in this study.

Children of all ages agree on their relative status relationships with many of their peers, and their agreement increases with age - from virtually no agreement beyond the boy-girl difference in nursery school to sixty-six percent agreement in third grade. Of the remaining pairs both children could say that the other child is tougher, or each of them could say that the self was tougher. This latter was termed overrating and a percent of overrating was formed by taking all of those pairs and dividing by all of the pairs in which disagreement occurred.

Table 5 shows the results. Boys were found to overrate themselves in comparison to other boys significantly more than girls overrated themselves with other girls ($p \leq .006$). Eighty to ninety percent of the boys' pairs where disagreement occurred overrated themselves from kindergarten through third grade. In contrast the girls' amount of overrating changed markedly during this period (K=98%, 1st=28%, 2nd=59%, and 3rd=81%).

For both sexes the high amount of overrating and low rate of agreement between pairs in the preschool years is seen as reflecting the

children's egocentrism. While becoming more accurate in their perceptions of self and others as they grow older the boys maintain an element of egocentrism. If there is doubt about a relationship it is decided in favor of the self. The boys confront their peers and if there indeed is a dominance hierarchy then this overrating would appear to be an important perceptual characteristic for them because many losses may not matter if the other is seen as being lower in the hierarchy.

Girls engage only a few others at a time and their hierarchy is not as well defined. Their shift from overrating to underrating in first grade may be their response to adult authority, i.e., to be 'good', as well as a withdrawl from the rough-and-tumble world of the boys - a time for watching and learning about others.

From second to third grade both sexes are again overrating. Although this increase was not hypothesized previously, it may also be explainable by reference to Piaget. In his study of moral judgment, Piaget (1965) differentiated between two attitudes toward following rules. At the age of first and second grade, the child regards the rules of the game as eternal and unchangeable. At a later age the child believes that rules may be changed, and that he may influence their changing. In the case of making hierarchies the first and second grade children were trying to report the 'correct hierarchy', but in third grade the child may have been aware that he or she was making the hierarchy and could put people anywhere he or she might wish. When pilot testing the hierarchy test, we found that the younger children asked if they were 'right' after they formed the hierarchy, but the older children did not ask if they were right. Sometimes the third graders would put themselves high in the hierarchy and smile

impishly, as though they just wanted to see themselves high.

Conclusions

Some of the social actions of children fit nicely within a primate paradigm. This is most evident with sex differences in the size of the children's groups, their amount of association with an adult, and the levels of activity and aggressive actions. The children's perceptions of dominance hierarchies within their classrooms resemble the hierarchies derived from the actions of primates.

The boys were found to have more agreement on their portion of the hierarchy than do the girls, but that boys are tougher than girls had even significantly more agreement for both sexes. Despite the apparent lack of contact between the sexes during play periods the children's direction of attention included the opposite sex. It was found that each sex could accurately perceive the hierarchy created by the opposite sex. Boys were more involved in aggressive encounters and an apparently necessary corollary of this was that the boys overrated their own status position. Girls were not as involved in forming hierarchies and showed a period during which they underrated themselves.

We are continuing research in the area of the relationship between cognitive development and children's social experiences. Both the ability to seriate and to perceive transitive relations would appear to receive reinforcement from social encounters. If so, then the real world of social interactions with peers might be a very necessary part of each child's educational experience.

References

1. Chance, M.R.A. and Jolly, C.J. Social Groups of Monkeys, Apes and Men. New York: Dutton, 1970.

2. Edelman, M.S. Peer group formation in young children: perception. Ph.D. dissertation, University of Chicago, 1973.

3. _____and Omark, D.R. Dominance hierarchies in young children. Social Science Information, 12, 1, 1973.

4. Kummer, H. Social Organization of Hamadryas Baboons. Chicago: University of Chicago Press, 1968.

5. McGrew, W.C. An Ethological Study of Children's Behavior. London: Academic Press, 1972.

6. Omark, D.R. Peer group formation in young children: action. Ph.D. dissertation, University of Chicago, 1972.

7. Piaget, J. The Moral Judgment of the Child. New York: The Free Press, 1965.

8. Sommer, R. Personal Space: The Behavioral Basis of Design. Englewood Cliffs, N.J.: Prentice-Hall, 1969.

Criteria for Observations

	Dist.	Verb.	Agg.	Imit.	Int.	Comments
x N1						
N2						
Dist. N3						
Cov. Other						

Explanation:

X -The child being observed

Dist. Cov. -This is an activity score and is an estimate of the total distance covered by the child during the 30 seconds he is observed.

N1, N2, N3 -These are the three nearest neighbors, spatially, to X. They may or may not be interacting.

Dist. -This is the distance which each is from X. This will be recorded as:
(<1/3m.) C - actual contact with X
(< 1m.) T - within touching distance if both N. and X raised their arms, but not touching
(1 -2m.) S -normal speaking distance
(> 2m.) Y- yelling distance

Verb. -A check is put here if X or N is talking during the observation period. If direction of communication can be determined, an arrow is inserted in the box, e.g. → means X talks to N. = means both are talking to each other.

Agg. -A check here means that an obvious physical aggressive encounter took place, e.g., hitting, punching, pulling down. If the fighting is onesided, an arrow indicates the attacker.

Imit. -A check here indicates imitative behavior, e.g., two or more engaged in the same kind of action, at the same time.

Int.	-Interaction is occuring between X and N, but it is not aggressive or imitative. Describe under comments.
Comments	-These lines are for comments about the gestures, imitative actions, etc. Interactions will be briefly described here.

Table 1. Maximum and average number of children in groups of predominantly one sex (>60%).

Predominant sex of the groups		Grade			
		N	K	1	2
Boys	Max.	6	10	11	16
	Avg.	3.36	2.28	3.46	4.55
No. of Grps Observed		40	200	75	18
Girls	Max.	5	6	5	6
	Avg.	3.86	1.92	2.16	3.60
No. of Grps Observed		29	163	118	20

Table 2. Percent of the three nearest neighbors of the observed child who are boys, girls or adults (n=number of observations on children).

Child being observed		Grade			
		N	K	1	2
Boys	Boys	48.5	65.2	74.0	66.3
	Girls	30.4	28.3	21.9	28.5
	Adults	20.1	6.5	4.1	5.2
	n	105	211	181	84
Girls	Boys	29.1	40.2	19.6	39.0
	Girls	48.8	48.5	69.9	52.4
	Adults	22.1	11.3	10.5	8.6
	n	95	195	217	86

Table 3. Percent of children observed, of each sex, who were physically interacting with their nearest neighbors on the playground: (n as in Table 2.)

	N	K	1	2
Boys	29.6	32.7	95.1[1]	75.0[1]
Girls	23.1	19.4	27.2	71.8[1]

[1]An interaction with one neighbor counts for one encounter, with two neighbors counts for two encounters, hence the high percentages mean that some of the children are interacting with more than one neighbor.

Table 4. Dominance hierarchy distribution of children by quintile rank at each grade level (% of each sex).

Grade	Sex	N	Quintile Rank				
			1	2	3	4	5
N	Boys	22	27	23	23	23	5
	Girls	19	5	5	26	26	37
K	B	69	29	35	25	10	1
	G	47	-	2	13	46	40
1	B	54	31	35	22	7	4
	G	50	4	6	12	36	42
2	B	55	25	38	25	5	5
	G	45	4	-	13	33	49
3	B	38	32	42	16	8	3
	G	36	-	-	25	33	42

Table 5. Analysis of variance of grade and sex effects for per cent of overrating for the dimension "toughest"

	F value	P
Grade Effects		
Linear	7.3	0.01
Quadratic	52.7	0.0001
Remaining effects	6.4	0.02
Sex Effects		
Male Dyads vs Female Dyads	9.9	0.006
Cross-sex vs Male Dyads	2.16	0.16
Grade by Sex Interaction	6.6	0.0009